SECTION C

DESCRIPTION/SPECIFICATIONS
REPLACE RATTLESNAKE CANAL DIVERSION STRUCTURE D
QUIVIRA NATIONAL WILDLIFE REFUGE
(09-130R)

INDEX

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide all labor, materials, equipment, investigations, and design verification services required to replace a water control structure including, but not limited to:

1. Demolition of existing structures, including metal work and concrete.

2. Constructing reinforced replacement concrete box culvert bridge/water control structure, inlet and outlet transitions/aprons, and concrete canal slope armor. The Contractor may choose to use either cast-in-place or pre-cast box culvert sections.

3. Metalwork items, including guardrails, stoplog guides, and accessories.

4. Riprap with filter fabric.

5. All associated earthwork, diversion, and dewatering control.

6. Design for box culvert and appurtenant items. Design shall include any surveying required for planning, design, and construction control and to determine proper sizing of box culvert sections. The box culvert sections shall be sized to accommodate the estimated maximum canal capacity without overtopping. A preliminary estimate of maximum canal capacity is 1,400 cfs, based on estimated canal side slopes of 3:1, bottom grade of 0.00175 ft/ft, bottom width of 31 feet, and depth of 6 feet. Surveying and/or onsite flow measurements will be required to determine a recommended design canal capacity, which shall be included in the design submittals.

B. Work shall proceed only after the Notice to Proceed (NTP), issued by the Contracting Officer. Work shall not be completed on items requiring Submittals until Submittals have been approved by the Contracting Officer.

1.02 JOB CONDITIONS

A. The existing structure is located within Rattlesnake Canal. Canal deliveries shall be coordinated with the Refuge Manager and may need to be either regulated using upstream structures and/or diverted around the existing structure. A diversion and dewatering plan will be a required submittal. Local rainfall events may produce significant runoff which should be considered within the scope of the diversion and dewatering plan.

1.03 QUALIFICATIONS

A. The Contractor shall have all certificates and licenses required by law for the execution of the work, and shall comply with all Federal, State, or local laws, ordinances, or rules and regulations relating to the performance of the work.

1.04 LOCATION

A. The work site is located at the Quivira National Wildlife Refuge, approximately 30 miles west/northwest of Hutchinson, Kansas.

B. Prospective bidders may inspect the site by making arrangements with the Refuge Manager, Quivira National Wildlife Refuge, 1434 NE 8th Street, Stafford, Kansas 67578-8818, Phone: 620-486-2393, Fax: 620-486-2315.

1.05 SURVEYING

A. The Contractor will be responsible for all associated surveying.

B. The existing structure is a concrete weir with two stoplog bays. The replacement structure must be capable of safely passing the estimated maximum canal capacity and shall be set at a finish grade which allows the canal water surface to be raised (via placement of stoplogs) to allow satisfactory diversions through Structure RCF. The Contractor shall establish temporary benchmarks before demolition, at upstream and downstream ends, to facilitate proper placement of the new structure at the required finish grade.

Contractor shall submit verification that proposed box culvert size and number of openings have sufficient hydraulic capacity to pass the estimated maximum canal flow.

1.06 APPLICABLE CODES, STANDARDS AND SPECIFICATIONS

A. All work shall comply with codes and standards applicable to each type of work as listed in individual sections of these specifications.

1. Where a conflict occurs between referenced documents and the Project Specifications, the Project Specifications govern.

2. Where a conflict occurs between referenced documents, the document containing the most stringent requirements governs.

3. Where referenced documents are not specified by date, the applicable version of the document shall be the version current at the bid opening.

4. Materials, applications, and tests specified by reference to published standards of a society, association, code, or other published standards are included in the specifications as if written in their entirety.

5. Conform to all regulations and statutes of the State of Kansas and to all Federal regulations which apply.

1.07 ABBREVIATIONS

A. Abbreviations used throughout the specifications and the organization or document represented:

AASHTO	American Association of State Highways & Transportation Officials 444 North Capitol Street, N.W. Washington, DC 20001
ACI	American Concrete Institute P.O. Box 9094 Farmington Hills, MI 48333-9094
ANSI	American National Standards Institute 1430 Broadway New York, NY 10018
ASTM	American Society for Testing and Materials 1916 Race Street Philadelphia, PA 19103
AWS	American Welding Society, Inc. 550 N.W. LeJeune Road P.O. Box 351040 Miami, FL 33135

AWWA	American Water Works Association 6666 W. Quincy Avenue Denver, CO 80235
CSI	Construction Specifications Institute 1150 17th Street, N.W., Suite 300 Washington, DC 20036
EPA	Environmental Protection Agency Washington, DC 20460
FS	Federal Specifications GSA Business Service Center 7th & D Streets, S.W. Washington, DC 20407
NEC	National Electric Code Batterymarch Park Quincy, MA 02269
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor) Government Printing Office Washington, DC 20402
UL	Underwriters' Laboratories 333 Pfingsten Road Northbrook, IL 60062

B. Additional abbreviations will be defined as they appear in the specifications.

1.08 MANUFACTURER'S SPECIFICATIONS

A. Where manufacturer's products and processes are included in the specifications by reference, they shall be included in these specifications as if written in their entirety.

B. Products and processes included in the specifications shall conform to the manufacturer's latest published specifications.

C. At the request of the Contracting Officer, the Contractor shall provide a sworn affidavit from the manufacturer certifying that material, products, and processes delivered and used on the project meet the specified requirements. This affidavit shall not relieve the Contractor from his responsibility for full compliance with the requirements of the specifications.

1.09 SUBSTITUTIONS

A. The Contractor shall provide all equipment, materials, and services as specified or noted on the drawings, unless an approved substitution is obtained.

B. Where multiple manufacturer's names are noted, the first named shall indicate the basis for equipment design and drawing layout for the project.

C. Any proposals for substitution must be submitted to the Contracting Officer in writing for approval. Submittals shall include all data necessary for thorough comparison with specified item and reason for the proposed substitution.

D. For proposed substitutions, the Contractor shall:

1. Provide all additional drawings and data for approval as considered necessary by the Contracting Officer.

2. Pay for all labor and materials required as a result of the substitutions.

1.10 MEANS AND METHODS

A. Means and methods of construction shall be such as the Contractor or Subcontractors may choose; subject, however, to the Contracting Officer's right to reject means and methods proposed which:

1. Constitute a hazard to the work, persons, or property.

2. Will not produce finished work in accordance with terms of the contract.

3. Are contrary to specified means or methods included in the contract.

B. The right to reject means and methods of the Contractor or Subcontractor shall not be construed or interpreted as acceptance of control of means and methods by the Contracting Officer.

C. The Contracting Officer's approval of means and methods or failure to exercise right to reject means and methods shall not relieve the Contractor of the obligation to complete the work required by the contract.

D. Total responsibility for control of all means and methods lies with the Contractor for all work.

1.11 COORDINATION

A. Coordinate work so that Station operations will not be restricted and utilities will not be disrupted during critical periods in Station operations. Arrangements shall be made with the Refuge Manager to schedule tying into or disconnecting existing utilities; or performing any work which interferes with Government operations.

B. The Contractor shall notify the Refuge Manager at least 48 hours prior to putting any utility out of service.

C. Coordinate all work of the project to facilitate orderly progress and proper sequence of work at all times.

D. In the event that other contracts are in progress concurrently with this contract, the Contractor shall coordinate his work so as not to disrupt progress of other work, and shall cooperate to facilitate orderly progress of all work.

1.12 ENVIRONMENTAL PROTECTION

A. Pollution Control

1. The Contractor shall abate and control all environmental pollution arising from construction activities by complying with all applicable Federal, State, and local laws and regulations concerning environmental pollution control and abatement, as well as the specified requirements in this contract.

a. Compliance with this requirement by Subcontractors will be the responsibility of the Contractor.

B. Prevention of Water Pollution

1. The Contractor's construction activities shall be performed by methods that will prevent entrance or accidental spillage of solid matter, contaminants, debris, and other objectionable pollutants and wastes into streams, flowing or dry

watercourses, lakes, ponds, wetlands, and underground water sources. The Contractor shall dispose of all pollutants such as petroleum products, rubbish, cement, concrete, and objectionable material at a legal, offsite disposal site.

2. During construction the Contractor shall comply with all applicable Federal, State, and local laws and regulations concerning the control and abatement of water pollution.

3. The Contractor is responsible for implementing the terms and requirements of the Kansas storm water discharge permit, if required, as issued to the State under the National Pollution Discharge Elimination System (NPDES) by the Environmental Protection Agency (EPA). The Contractor shall apply for and execute all permits as required by the State of Kansas regarding storm water discharge from the construction site. The Contractor shall submit to the Contracting Officer all permit applications and all approvals from the State. Allow the Government 10 days for review of the application package prior to submission.

C. Abatement of Air Pollution

1. The Contractor shall comply with applicable Federal, State, and local laws and regulations concerning the prevention and control of air pollution.

2. Construction activities shall be performed in such a manner that air pollution is held to a minimum.

3. Burning of materials, trees and brush, combustible construction materials, and rubbish will not be permitted. Construction debris shall be hauled off the site to an appropriate landfill area.

D. Environmental Litigation

1. Time lost due to work stoppage because of failure of the Contractor to comply with these requirements may not be the subject of a claim for extension of time or for costs or damages.

E. Fossils and Cultural Materials:

1. Should the Contractor discover any fossils or cultural materials during construction operations, such objects shall become the property of the Government. The Contractor shall cease construction operations in the area of the "find," and immediately notify the station manager of such discovery. Construction operations may proceed in other areas not affected by this clause.

Care shall be exercised by the Contractor not to damage or collect fossils or cultural materials uncovered during excavation operations.

Failure to comply with this requirement may be considered a violation of the Archeological Resources Protection Act of 1979 as amended. Destruction of historic and prehistoric sites and/or unauthorized collection of cultural materials can result in criminal and/or civil penalties. Penalties can include fines, prison sentences, and/or confiscation of equipment.

If the Contractor uses materials obtained from a non-government source to perform the work that is required under this project, and a new borrow site is opened or an existing borrow area is expanded in order to obtain such materials, the Contractor shall assure that any new borrow area disturbance meet the requirements of Section 106 of the National Historic Preservation Act.

1.13 SAFETY

A. The Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State, and local regulations pertaining to the protection of workers, visitors to the site, and persons occupying areas adjacent to the site, i.e., 29CFR1910 and 29CFR1926 of the Code of Federal Regulations. The Contractor is responsible for providing medical examinations and maintaining medical records of personnel as required by the regulations. The Contractor shall hold harmless the Government for failure to comply with any applicable safety and health regulation on the part of himself, his employees, or his subcontractors.

B. Special Safety Considerations in Confined Spaces

Per 29 CFR 1910.146, the Contractor shall evaluate all workplaces to determine if any spaces are permit-required confined spaces. If the workplace contains permit-required spaces, the Contractor shall inform exposed workers and government employees, by posting danger signs or by any other equally effective means, of the existence and location of and the danger posed by the permit spaces. Note: A sign reading "Danger Permit-Required Confined Space, Do Not Enter" or other similar language would satisfy the requirement for a sign. If work is performed within a permit-required confined space, emergency equipment shall be provided by the Contractor per 29 CFR 1910.146.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

PART 4 ACCEPTANCE AND MEASUREMENT

4.01 ACCEPTANCE

A. Acceptance of the work in Division 1 - General Requirements, shall be based on visual inspection and on acceptance of the required submittals in Division 1, according to Section 01400.

4.02 MEASUREMENT

A. All work required in Division 1 - General Requirements, will not be measured. All work in Division 1 will be included in bid items requiring the General Requirements described herein.

B. Material, labor and equipment used for cofferdams, diversion and dewatering, shall not be measured, but shall be paid for on a lump sum basis under the bid item in the Bid Schedule for Diversion and Dewatering.

END OF SECTION 01010

PART 1 GENERAL

1.01 PROGRESS MEETINGS

A. The Contractor or his project superintendent shall be available to meet with the Contracting Officer's Authorized Representative at the jobsite at least once each week during the operations to discuss work progress.

B. At the above meetings, the Contractor shall give verbal reports of progress on the project, discuss the work schedule, and present all conflicts, discrepancies, or other difficulties for resolution.

END OF SECTION 01200

PART 1 GENERAL

1.01 SUBMITTALS

A. Refer to technical specifications for all submittals required.

B. All submittals shall be accompanied by a Government-furnished submittal form which shall be used as the document for approving or disapproving the material. Four copies of data shall be provided by the Contractor with each submittal to allow the Government to retain three copies.

C. Make all submittals of data, items, and materials, and samples after receipt of the Notice to Proceed. The Contractor shall allow a minimum of 7 calendar days, but no more than 30 days, for Government review of any submittal.

D. Any work performed before the approval of required shop drawings, samples, or submittals shall be at the Contractor’s risk.

1.02 SAMPLES

A. If required, submit in duplicate.

1.03 SHOP DRAWINGS AND MANUFACTURER'S LITERATURE

A. Prior to use or installation of any item specified as requiring submittal, the Contractor shall submit manufacturer's literature containing detailed specifications and performance data fully describing the items.

B. The Contractor shall not perform work related to shop drawings or samples prior to obtaining the required approval by the Fish and Wildlife Service. Shop drawings shall be in sufficient detail compatible with the complexity of the project to adequately illustrate the relationship of major components.

C. The Contractor shall submit four (4) copies of all shop drawings. Contractor shall check shop drawings for conformity to the contract documents and mark them to this effect before submitting to the Contracting Officer.

1.04 CONSTRUCTION PROGRESS SCHEDULES

A. Submit construction schedule for approval after Notice to Proceed, including the following:

1. Breakdown of work activities in categories, as necessary, to allow monitoring of progress of work during construction.

2. Sequence of construction by activity with start dates, duration, and finish dates.

1.05 RECORD (AS-BUILT) DRAWINGS

A. Provide and maintain at the work site, one complete set of prints of the project drawings. The drawings shall be kept in good, clean, and readable condition.

B. The project site drawings shall have neatly inscribed all changes in work. Changes shall be noted with red pencil or red ink.

C. Submit these corrected prints at time of final acceptance and prior to final payment. Note all data and changes on these record drawings in sufficient detail and clarity and provide information necessary for preparation of "as-built drawings".

1.06 TESTS AND COMPLIANCE STANDARDS

A. The Contractor shall submit copies of tests or compliance standards as required in each Division.

B. Make all submittals of test data within 24 hours from the time the test was performed, unless noted otherwise in individual Sections of the specifications.

1.07 GUARANTEES, WARRANTIES, AND CERTIFICATES

A. Submit all guaranties, warranties, and certificates prior to final payment. Refer to Section 01700, Project Closeout.

1.08 DELIVERY TICKETS

A. The Contractor shall maintain, on the jobsite, one legible copy of each delivery ticket for all material delivered to the construction site. The tickets shall be submitted if requested by the Contracting Officer.

B. The delivery ticket shall show brand name, catalog number, and number of items received.

1.09 SUBMITTAL LIST

A. Submittals are required on the items as listed individually in each Section of the specifications. The description of the submittal data required is defined in the technical specifications.

END OF SECTION 01300

PART 1 GENERAL

1.01 COST OF QUALITY CONTROL TESTING

A. The cost for all required quality control tests shall be paid for by the Contractor and included in the bid item in which the test is required.

1.02 SUBMITTALS

A. Refer to Section 01300.

1.03 TESTS BY INDEPENDENT TESTING LABORATORY

A. Testing Laboratory

1. Independent testing laboratory shall be selected by the Contractor and the name and qualifications of the proposed laboratory submitted for approval.

2. The Contractor shall provide for all tests included in this Section.

B. Contractor's Responsibilities

1. It shall be the Contractor’s responsibility to provide for all tests included in these specifications. Failure to provide a specified test shall be considered the same as a test with a failed result.

2. Make available to testing laboratory, at no cost, all materials to be tested.

3. Provide labor necessary to supply samples.

4. Advise laboratory of the identity of material sources and instruct suppliers to allow inspections by the laboratory.

5. Submit written reports promptly, covering each inspection and test.

6. After initial tests have been performed, and if sampling, method, or workmanship does not comply with these specifications, the Contractor shall pay for any additional testing necessary to ensure compliance.

C. Test Standards

1. Tests shall be conducted in accordance with the requirements of the specifications designated or, where not specified, the latest standards of American Society for Testing and Materials.

D. Independent Testing Laboratory Services and Tests Required

1. Backfill Compaction - Refer to Section 02222 - Excavation and Backfill.

2. Concrete Testing – Refer to Section 03300 – Cast-In-Place Concrete

1.04 QUALIFICATIONS FOR WELDING WORK

A. Welders shall possess qualification documents provided by an independent testing laboratory under AWS Code, Standard Qualification Procedure.

B. Qualification documents shall be dated no earlier than six months prior to the start of the work. Welders not engaged in welding for a period of three or more months shall be re-qualified.

END OF SECTION 01400

PART 1 GENERAL

1.01 WEATHER PROTECTION

A. General

1. Provide necessary protection against weather to keep all materials, equipment, and completed work free from damage during shipment, in storage, or in place.

2. Do not perform wet work when temperature is below 40 degrees F or is forecast to be below 40 degrees F within the ensuing 48 hours, except when work is properly protected and sufficient heat is provided, as approved by the Contracting Officer.

B. Heat Provision

1. When heat is required for proper weather protection, provide temporary enclosures of work and acceptable means to provide sufficient heat to maintain a temperature of not less than 50 degrees F. Provide higher temperatures when required by these specifications.

2. Use only heating equipment and fuels of approved, safe type. Keep equipment and surroundings in a clean, safe condition. Use flame resistant tarpaulins and other materials for temporary enclosure of space. Use vented heaters only.

1.02 TEMPORARY UTILITIES

A. Electricity and Lighting

1. The Contractor shall be responsible for providing temporary electrical service for equipment to perform the work.

2. Provide and maintain temporary lighting including at all barricades as may be required for safety.

B. Telephone

1. The Contractor shall provide communication devices that are available and ready at the work site, to alert others in emergency situations.

C. Water

1. The Contractor shall provide, protect, and maintain an adequate water supply for use on the project for construction purposes. Contractor will be allowed to take water from the nearby reservoir pools.

2. The Contractor shall be responsible for providing potable water for the workers.

D. Toilets

1. The Contractor shall:

a. Provide and maintain suitable, weathertight, painted, sanitary toilet facilities for all workers during the work period. When toilet facilities are no longer required, promptly remove them from the site. Disinfect and clean or treat the area as necessary.

b. Provide and maintain facilities in accordance with the requirements of applicable local and State health authorities and OSHA.

c. Keep all toilet facilities clean and supplied with toilet paper at all times.

1.03 OPERATION AND STORAGE AREAS

A. All operations of the Contractor (including storage of materials) upon Government premises shall be confined to areas authorized or approved by the Contracting Officer.

B. Government premises adjacent to the construction will be made available for use by the Contractor without cost whenever such use will not interfere with other Government uses or purposes.

C. The Contractor shall not enter or occupy with men, tools, equipment, or material any ground outside the Government's property without the written consent of the owner of such ground.

D. Other Contractors, employees, and permittees or agents of the Government may, for all necessary purposes, enter upon the work and premises used by the Contractor, and the Contractor shall conduct his work so as not to impede unnecessarily any work being done by others on or adjacent to the site.

E. Materials which are stored at the site that might be damaged by exposure to the environment shall be protected by the Contractor. Provide weathertight coverings or storage sheds.

1.04 PROTECTION AND RESTORATION

A. The Contractor shall protect all structures, including vegetation, during the progress of the work; shall remove from the site all debris and unused materials; and shall, upon completion of the work, restore the site as nearly as possible to its original condition, including the replacement, at the Contractor's expense, of any facility or landscaping which has been damaged.

1.05 PARKING

A. The Contractor shall provide employee parking on the project within the site limits. Maintain all roads and parking areas during the construction period.

B. Park vehicles to avoid interference with normal construction activities and to avoid interference with Government operations.

1.06 SAFETY

A. Provide at least one nonfreezing-type fire extinguisher at the worksite. Place in location readily accessible to workers.

B. The Contractor shall be responsible for providing medical examinations and maintaining medical records of personnel as required by the regulations.

C. Every employee is responsible for complying with applicable safety requirements, wearing prescribed safety equipment and preventing avoidable accidents and property damage.

D. Provide and maintain a basic first-aid kit for use of workers.

1. Provide first-aid supply commensurate with size of project with items necessary for first-aid treatment of all injuries.

2. Advise all workers of the location of first aid supplies.

3. Post telephone numbers of nearest hospital or ambulance service and fire station in conspicuous location. Advise all workers of location of telephone and telephone numbers.

4. Communication devices shall be available and ready at the work site, to alert others in emergency situations.

1.07 ACCESS ROADS

A. Where existing roads are not available, access to the work shall be provided by and at the expense of the Contractor. Prior to the building of access roads across lands under the jurisdiction of the Government, the Contractor shall obtain approval of the Contracting Officer.

B. Public access roads damaged by the Contractor shall be restored at the Contractor's expense to the same condition they were in at the commencement of the work.

C. Access to construction shall be accomplished with regard for environmental consideration.

1.08 TRAFFIC REGULATION

A. The Contractor shall provide, erect and maintain all necessary barricades, suitable and sufficient flasher lights, and shall take all necessary precautions for the protection of the work and the safety of the public.

B. All barricades and obstructions shall be illuminated at night and all lights shall be kept burning from sunset until sunrise.

C. Roads closed to traffic shall be protected by effective barricades on which shall be placed acceptable warning signs.

END OF SECTION 01500

PART 1 GENERAL

1.01 STORAGE AND PROTECTION

A. Protect all materials, work, and equipment against damage at all times.

B. Refer to Section 01500 for requirements for storage of materials. Store all materials that might be damaged in storage sheds, or under weather tight coverings.

C. Prefabricated components, and other manufactured items, shall be delivered and stored in such a manner that they will not be damaged or deformed. Material shall be stacked on platforms or pallets and covered with tarpaulins or other suitable weather tight, ventilated covering.

END OF SECTION 01600

PART 1 GENERAL

1.01 FINAL INSPECTION

A. The Contractor shall request a final inspection in writing at least ten (10) days prior to the anticipated date of completion.

B. Work will not be considered ready for final inspection until all the work has been completed and the Contractor has certified that all items are in strict compliance with all contract terms and conditions.

C. The Contractor or his project supervisor shall be at the jobsite during the final inspection.

1.02 SUBMITTALS

A. Submit all written guarantees, warranties, and certificates required under Section 01300 to the Contracting Officer prior to final payment.

1. Guarantees shall extend the full period of the required guarantee period after:

a. Replacement of work found defective during guarantee period.

b. Repair of inoperative items or adjustments to proper working condition of items not operating properly at time of inspection at final completion.

B. Submit as-built drawings required under Section 01300 prior to final payment.

END OF SECTION 01700

END OF DIVISION 1

PART 1 GENERAL

1.01 WORK INCLUDED

A. The work of this section consists of removing and disposing of the existing water control structure, structure metalwork, concrete canal slope armor, and an existing circular fiberglass pipe. Refer to the project drawings for illustrations of the existing structures.

B. The conditions and extents of the existing structures below the visible grade are unknown. Contractor shall remove all portions of the existing structures that interfere with the new construction. Cost of such work shall be included in the price bid for demolition.

C. Note: the existing circular fiberglass pipe shall NOT be moved offsite but shall be stockpiled near the worksite to allow removal and transport by Station personnel.

D. The existing concrete may be used for replacement riprap provided the recycled material meets the requirements stated in Section 02541, Riprap and Filter Fabric.

1.02 DEFINITIONS

A. Demolition as defined herein shall be the removal, hauling, and disposal of the existing structures as noted above.

1.03 SUBMITTALS

A. Refer to Section 01300, Submittals.

B. Submit weight tickets or receipts for each type of material recycled.

PART 2 PRODUCTS

None

PART 3 EXECUTION

3.01 PREPARATION

A. Set temporary benchmarks to mark existing structure elevations, as needed.

B. Excavate earth material from around the existing structures to permit removal of the structures and to allow construction of the new structures. See Section 02222 - Excavation and Backfill.

3.02 DEMOLITION

A. Raze, remove and dispose of existing structures.

3.03 DISPOSAL

A. All demolished materials shall be removed from the site and disposed of in a licensed landfill, as appropriate, with exception of the items noted.

B. Construction debris shall be recycled to the greatest extent possible. Contractor shall submit weights of each type of material recycled.

PART 4 ACCEPTANCE AND MEASUREMENT

4.01 ACCEPTANCE

A. Acceptance for the work of this Section shall be based on visual inspection, in accordance with Section 01400.

4.02 MEASUREMENT

A. Material, labor, and equipment used for demolition of the existing water control structure shall not be measured, but shall be paid for on a lump sum basis under the bid item in the Bid Schedule for Demolition.

END OF SECTION 02060

PART 1 GENERAL

1.01 DESCRIPTION

A. The work of this Section consists of clearing trees, vegetation, brush, rubble, and other debris from construction areas to provide suitable construction conditions.

PART 2 PRODUCTS

None

PART 3 EXECUTION

3.01 GENERAL

A. Clearing: Remove debris, brush, rubble, and vegetation from areas to be cleared.

B. Disposal: Sites are not available on the refuge for disposal of waste materials. Dispose of all wasted material at a legally designated disposal site. Burning of combustible materials at the site will not be permitted.

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PART 4 ACCEPTANCE AND MEASUREMENT

4.01 ACCEPTANCE

A. Acceptance for the work of this Section shall be based on visual inspection, in accordance with Section 01400.

4.02 MEASUREMENT

A. Material, labor, and equipment required for clearing will not be measured but will be included in the lump sum price bid in the Bid Schedule for Site Clearing.

END OF SECTION 02100

PART 1 GENERAL

1.01 WORK INCLUDED

A. The work of this Section consists of loading, hauling, and placing predominately clay type material from borrow for use in cofferdams for diversion and dewatering and for construction of cutoff trenches if approved as part of the final foundation design.

B. Borrow areas are not available on the refuge property. Location and procurement of borrow materials are the responsibility of the Contractor.

1.02 RELATED WORK

A. Quality Control - Section 01400.

B. Site Clearing - Section 02100.

C. Excavation and Backfill - Section 02222.

1.03 REFERENCE MATERIAL

A. Unified Soil Classification System (USCS) as published in the Bureau of Reclamation Earth Manual.

PART 2 PRODUCTS

2.01 MATERIALS

A. Clay material classified as CL, CH, and variations thereof, in accordance with USCS, shall be used in cofferdams. Remove unsuitable materials such as rocks over 6-inches in maximum dimension, ice or frozen earth, muck and debris.

PART 3 EXECUTION

Not applicable.

3.02 DISPOSAL

A. Any waste materials may be disposed of at sites designated by the Refuge Manager. If sites are not available, dispose of all wasted material at a legal disposal site off the refuge property.

PART 4 ACCEPTANCE AND MEASUREMENT

4.01 ACCEPTANCE

A. Acceptance for the work of this Section shall be based on visual inspection, in accordance with Section 01400.

4.02 MEASUREMENT

A. Material, labor, and equipment required for borrow material including clearing, stripping topsoil, excavating, placing, removing, returning material, grading borrow site and replacing topsoil, shall not be measured, but shall be paid for on a lump sum basis under the bid item in the Bid Schedule for Diversion and Dewatering.

END OF SECTION 02203

PART 1 GENERAL

1.01 WORK INCLUDED

A. Work under this Section consists of excavation, placement of backfill, and compaction about structures.

B. References: Moisture-Density Relationship of Soils, ASTM D698.

1.02 RELATED SECTIONS

A. Quality Control - Section 01400

1.03 SAFETY AND PROTECTION

A. Excavations shall be sheeted, shored, and braced where required in a manner consistent with established safe practices.

1.04 TESTING

A. Independent Testing Laboratory shall perform tests in accordance with Section 01400, Quality Control.

B. Secure samples of backfill; samples shall represent the backfill material from excavation.

C. An Independent Testing Laboratory shall establish optimum moisture-density relationship in accordance with ASTM D698 for backfill from excavation.

D. The Independent Testing Laboratory shall perform density tests in accordance with this section.

1.05 SUBMITTALS

A. Refer to Section 01300 - Submittals.

B. The Independent Testing Laboratory shall submit test results in accordance with provisions of Section 01400. Submit compaction test results to the Contracting Officer within 24 hours after the tests are performed.

PART 2 PRODUCTS

2.01 MATERIALS

A. Backfill from excavated materials - Excavated material may be used as backfill provided the following unsuitable materials are removed; rocks over 6-inches in maximum dimension, ice or frozen earth, muck, and debris.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to excavating:

1. Remove gravel surfacing, if any, and stockpile for later use.

2. Remove existing riprap, if any, and stockpile for later use.

3.02 EXCAVATION

A. Perform to the lines, grades, and elevations indicated on the drawings.

B. Foundations for structures shall be level, clean, true to size, and clear of loose materials.

C. Maintain excavation free of water at all times.

D. If unsuitable foundation material is encountered, such as in rock or water bearing earth, excavate to stable ground in accordance with requirements outlined below.

E. Any and all excavation for the convenience of the Contractor or over excavation performed by the Contractor for any purpose or reason except as may be ordered in writing by the Contracting Officer and whether or not due to the fault of the Contractor, shall be at the expense of the Contractor. Where required to complete the work, all such excess excavation and over excavation shall be refilled with backfill, defined in 2.01 above, and compacted to the density outlined below at the expense of and by the Contractor.

F. In the event it is necessary to remove unsuitable material below the excavation lines shown on the drawings, the Contracting Officer shall be notified and an adjustment in the contract price will be made in accordance with the contract. Excavations carried below the depths indicated without specific direction shall, except as otherwise specified, be refilled to the proper grade with backfill defined in 2.01 above, and compacted to the density outlined below at the expense of and by the Contractor. All additional work of this nature shall be at the Contractor's expense.

3.03 BACKFILL PLACEMENT

A. Backfill shall be placed and compacted, to the lines, dimensions, and elevations shown on the drawings. Refer to 2.01 MATERIALS. Compact each layer with mechanical tampers to a density outlined in 3.04 below.

B. Place backfill in horizontal layers not more than 8 inches thick, with the proper moisture content for best compaction. Flooding or puddling will not be allowed.

C. Backfill around the structure shall be placed on alternate sides, in 8-inch layers, and compacted. Place backfill alternately to keep it the same elevation on both sides of the structure at all times.

D. Place and compacted backfill adjacent to structures in a careful manner such as to prevent stressing of the structure components. Compaction equipment or methods that produce horizontal or vertical earth pressures which may cause excessive displacements or which may damage the installation shall not be used.

E. Heavy equipment for spreading and compacting backfill and fill shall not be operated closer to the structure than a distance equal to the height of the backfill above the foundation.

F. Concrete structures shall cure for at least 7 days after concrete placement, before being backfilled.

G. Protect excavations from accumulation of water. If foundation becomes saturated, allow to dry before placing backfill.

3.04 COMPACTION

A. Compact each backfill layer to 95 percent of maximum dry density as determined by ASTM D698. Moisture content shall be within 2 percent of optimum.

1. Density Control - Conduct Tests for density control during compaction operations in accordance with the requirements of:

a. ASTM D-2922 - Tests for Density of Soil and Soil-Aggregate in Place by Nuclear Methods.

b. ASTM D-1556 - Test for Density of Soil-In-Place by sand-cone method; or

c. ASTM D-2167 - Test for Density of Soil-In-Place by the Rubber-Balloon method.

2. Tests Required: Perform one density test for each 30 yards of backfill material placed. Any layer which shows a density less than that specified shall be recompacted to the required density before additional material is placed.

3.05 GRADING

A. Return stockpiled gravel surfacing material, if any, to road surface, and spread to original road grades.

B. Grade road tops and shoulders adjacent to the structure for positive drainage.

3.06 DISPOSAL

A. Waste and excess earth materials shall be stockpiled at sites designated by the Refuge Manager. If no sites are available, dispose of all waste and excess earth material at a legally designated disposal site off the refuge property.

PART 4 ACCEPTANCE AND MEASUREMENT

4.01 ACCEPTANCE

A. Acceptance for the work of this Section shall be based on visual inspection, approval of the required submittals, and analysis of required test results, according to Section 01400.

4.02 MEASUREMENT

A. Earthwork including excavation, foundation preparation, backfill, compaction, grading, and disposal shall not be measured, but shall be paid for on a lump sum basis under the bid item in the Bid Schedule for Earthwork.

END OF SECTION 02222

PART 1 GENERAL

1.01 WORK INCLUDED

A. The work of this Section consists of furnishing and placing riprap with geotextile filter fabric to the lines, grades, and dimensions shown on the drawings. Work also includes removing and stockpiling existing riprap, if any, and placing stockpiled riprap as noted above.

1.02 SUBMITTALS

A. Refer to Section 01300, Submittals.

B. Submit product data for filter fabric.

C. Submit gradation analysis for riprap material.

PART 2 PRODUCTS

2.01 MATERIALS

A. Riprap

1. Riprap shall consist of sound, durable field stone or quarry stone.

2. Stone shall be hard, durable, angular in shape, resistant to weathering and water action.

3. Stone shall be free of overburden, spoils, shale, structural defects, and organic material.

4. The stone shall not contain cracks or flaws that would cause splitting or breakup during loading, hauling, and placing.

5. The riprap shall meet the requirements of the Kansas Department of Transportation Standard Specifications for State Road and Bridge Construction,

   Subsection 1116, Stone for Riprap. Riprap stone sizes and gradation shall conform to 1/4-Ton Class material. Gradation requirements are as follows:

Size (LBS)	Percent Heavier
1000	0
500	50+
75	90+

6. Quarry stone shall be obtained from an undisturbed deposit of rock that, if properly processed, would meet the requirements of concrete coarse aggregate for soundness and abrasion. Local deposits of sandstone or limestone and similar stone of sedimentary origin shall not be used as riprap stone.

B. Broken Concrete Riprap

1. The Contractor may recycle the existing concrete demolished onsite for replacement riprap. All such material must meet the requirements of this section.

2. The concrete riprap shall be reasonably well graded from the largest to the smallest sizes. The Contractor shall size the riprap by breaking the concrete rubble so that no individual piece will have a volume greater than 3.5 cubic feet.

3. No more than 10 percent of the riprap pieces shall have a volume of less than 30 cubic inches.

4. Fifty percent of the riprap shall be composed of pieces with a volume less than 1,220 cubic inches.

5. Each piece shall have no dimension greater than 3 times its least dimension.

6. Control of the sizing shall be by visual inspection to verify that the concrete rubble is well graded and does conform to the maximum and minimum sizes specified.

7. The Contractor shall place the broken concrete so each piece is touching the adjacent pieces in a configuration creating the highest possible density while producing a reasonably solid mass within the limits shown in the plans. All material shall be placed so that the large and small sizes are well mixed. Reinforcing steel bars projecting from the mass shall be cut off.

8. Broken concrete riprap shall be measured by the ton. The weight will be determined by measuring the volume (cubic yards) of broken concrete riprap placed and multiplying by 1.35 ton/cubic yard.

C. Geotextile Filter Fabric

1. Shall be a non-woven cloth of polypropylene monofilament fibers with a minimum permeability of 0.1 centimeter per second. The cloth shall be resistant to commonly encountered soil chemicals, mildew, insects, and shall not be biodegradable. Geotextile filter fabric shall be Mirafi 140N, or approved equal.

PART 3 EXECUTION

3.01 PLACEMENT OF RIPRAP AND FABRIC

A. Place geotextile filter fabric at the interface between riprap and surrounding soil, as shown on the drawings.

B. Secure the fabric using steel pins or other approved method.

C. The riprap shall be placed in a manner that will ensure the riprap in place is homogenous. The larger stone shall be uniformly distributed and firmly in contact with one another, with the smaller rocks filling the voids between the larger rocks.

D. The thickness of the riprap, as shown on the drawings, shall be measured perpendicular to the slope on which it is placed.

E. The riprap shall be sufficiently manipulated by hand or machine methods to secure a regular surface and mass stability.

F. Special care shall be taken in handling and placing riprap around structures. Structures which are damaged shall be repaired or replaced by the Contractor at no expense to the Government.

PART 4 ACCEPTANCE AND MEASUREMENT

4.01 ACCEPTANCE

A. Acceptance for the work of this Section shall be based on visual inspection, in accordance with Section 01400.

4.02 MEASUREMENT

A. Material, labor, and equipment required for riprap, including furnishing, transporting, and placing riprap with geotextile filter fabric, and removing, stockpiling, and placing stockpiled riprap, will not be measured but will be included in the lump sum price bid in the Bid Schedule for Riprap.

END OF SECTION 02541

END OF DIVISION 2

PART 1 GENERAL

1.01 WORK INCLUDED

A. This section covers the use of forms in the construction of cast-in-place concrete structures.

1. Forms shall be used, wherever necessary, to confine the concrete and shape it to the required lines.

2. Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete, and shall be maintained rigidly in proper position. Surfaces and joints of forms shall be sealed sufficiently to prevent absorption of water into forms or loss of mortar from the concrete.

1.02 RELATED WORK

A. Section 03200 - Concrete Reinforcement

B. Section 03300 - Cast-In-Place Concrete

1.03 QUALITY ASSURANCE

A. Formwork shall conform to ACI 347 with particular attention to dimensional tolerances for all work.

PART 2 PRODUCTS

2.01 FORM MATERIALS

A. Sheathing and Lining

1. Wood sheathing or lining shall be softwood or plywood of such kind and quality, or shall be so treated or coated, that there will be no deterioration or discoloration of the formed concrete surfaces due to chemical action, contamination, or uneven absorption of water from the concrete. Plywood used for form sheathing or lining shall be class 1, grade B-B, in accordance with the latest edition of Product Standard PS1 of the U.S. Department of Commerce. Softwood lumber used for form sheathing shall be Douglas Fir-Larch species, No. 2 grade or better.

2. Steel used for steel sheathing or lining shall conform to ASTM A 36 and shall be free of rust and other surface imperfections.

2.02 FORMWORK ACCESSORIES

A. Form Ties:

1. Provide factory-fabricated, adjustable-length, removable or snapoff metal form ties, designed to prevent form deflection and to prevent spalling at the faces of the concrete.

2. Provide ties so that portion remaining within concrete after removal of the exterior parts is at least 1 inch from the outer concrete surface. Provide form ties which will not leave a hole larger than 1-inch in diameter in the concrete surface.

B. Form Release Coatings:

1. Provide coating compound which will not stain concrete, absorb moisture, or adversely affect concrete surfaces and will not impair subsequent treatment of concrete surfaces requiring bond or adhesion, or impede the wetting of surfaces to be cured with water or curing compound. Material must be safe for potable water.

2.03 EMBEDDED ITEMS

A. Set and build into the formwork, any anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and measurements before proceeding with formwork.

3.02 PREPARATION

A. Forms shall be free from encrustations of mortar, grout, or other foreign material prior to concrete placement.

B. Apply form release coating on formwork in accordance with manufacturer's instructions. Apply prior to placing reinforcing steel, anchoring devices, and embedded items.

3.03 ERECTION

A. Provide bracing as necessary to ensure the stability of formwork.

B. Construct formwork to maintain tolerances in accordance with ACI 301.

3.04 FORM REMOVAL

A. To facilitate satisfactory progress with the specified curing and to allow the earliest practical repair of surface imperfections, forms shall be removed within 24 hours after the concrete has hardened sufficiently to prevent damage by careful form removal, and specified repair and curing shall commence immediately thereafter. It is the Contractor's responsibility to design and build adequate forms and to leave them in place until the forms can be safely removed.

PART 4 ACCEPTANCE AND MEASUREMENT

4.01 ACCEPTANCE

A. Acceptance for the work of this Section shall be based on visual inspection, according to Section 01400.

4.02 MEASUREMENT

A. All work required in this Section will not be measured for payment. Payment for work in this Section shall be included in the lump sum price bid in the Bid Schedule for Concrete Structure.

END OF SECTION 03100

PART 1 GENERAL

1.01 WORK INCLUDED

A. Work includes furnishing and placing reinforcing steel and related accessories for cast-in-place concrete.

1.02 RELATED WORK

A. Section 01300 - Submittals

B. Section 03100 - Concrete Formwork

C. Section 03300 - Cast-In-Place Concrete

1.03 SUBMITTALS

A. Submittals shall be in accordance with Section 01300.

B. Submit mill test certificates of supplied reinforcing steel indicating physical and chemical properties.

1.04 QUALITY ASSURANCE

A. Performance of reinforcement work shall be in compliance with "Building Code Requirements for Structural Concrete" (ACI 318), "Details and Detailing of Concrete Reinforcement" (ACI 315), and "Manual of Standard Practice" by the Concrete Reinforcing Steel Institute.

PART 2 PRODUCTS

2.01 REINFORCING STEEL

A. Reinforcing bars shall be deformed bars conforming to ASTM A 615, Grade 60, for all bars except ties and stirrups which shall be ASTM A 615, Grade 40.

B. Dowel bars located at expansion joints, shall be plain steel bars conforming to ASTM A 615, Grade 60.

2.02 ACCESSORY MATERIALS

A. Accessories such as chairs, bolsters, and hangers shall be sized and shaped for strength and support of reinforcement during installation and placement of concrete. Where the concrete surface in the finished structure will be exposed to the weather or where rust would impair special finishes, the portions of all accessories in contact with the formwork shall be made of plastic or galvanized.

PART 3 EXECUTION

3.01 CONCRETE COVER OVER REINFORCING STEEL

A. Reinforcement shall be placed such that the cover between the face of concrete and nearest reinforcement is 1-1/2 inches for #5 bars, and smaller; 2 inches for #6 bars through #8 bars; and 3 inches for #9 bars through #11 bars, unless otherwise specified. Provide 3 inches of cover for all bars when the concrete is placed against earth or rock, unless otherwise specified.

3.02 SPLICES

A. Splice length shall be in accordance with ACI-318-89 except minimum splice length shall be 18 inches.

B. Splices shall be located at points of minimum stress.

C. Stagger splices as much as possible.

3.03 BENDING

A. Reinforcement shall be bent cold to shapes shown on the drawings. Contractor will not be allowed to rebend improperly bent steel.

3.04 INSTALLATION

A. Prior to concrete placement, the surfaces of the reinforcing steel bars and the surfaces of any supports shall be cleaned of heavy flaky rust, loose mill scale, dirt, grease, or other foreign substance which, in the opinion of the Contracting Officer, are objectionable.

B. Place, support, and secure reinforcement against displacement during concrete placement. Do not deviate from alignment or measurement. Only approved devices shall be used for securing reinforcement in place. Lumber, brick, rock, and other items not designed for this purpose are prohibited.

C. Reinforcement shall be accurately placed to meet the following tolerances:

1. The amount of concrete cover protecting reinforcement shall not deviate from that specified by more than 2 inches if the specified cover is more than 2-1/2 inches, nor by more than 1/4 inch if the cover specified is 2-1/2 inches or less.

2. The spacing of reinforcing bars shall not deviate from the required spacing by more than 2 inches.

D. Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits, or embedded items. If bars are moved more than one bar diameter or enough to exceed the above tolerances, the resulting arrangement of bars shall require approval.

PART 4 ACCEPTANCE AND MEASUREMENT

4.01 ACCEPTANCE

A. Acceptance for the work of this Section shall be based on visual inspection and acceptance of the required submittals, according to Section 01400.

4.02 MEASUREMENT

A. All work required in this Section will not be measured for payment. Payment for work in this Section shall be included in the lump sum price bid in the Bid Schedule for Concrete Structure.

END OF SECTION 03200

PART 1 GENERAL

1.01 WORK INCLUDED

A. Work includes concrete, placement, finishing, curing, repair, and related items for cast-in-place concrete. Work also includes design of box culvert by the Contractor's Engineer. The Contractor may choose to use either cast-in-place or pre-cast box culvert sections.

1.02 RELATED WORK

A. Refer to Section 03100, Concrete Formwork.

B. Refer to Section 03200, Concrete Reinforcement.

1.03 ENGINEERING

A. The work in this section includes design of the reinforced concrete box culvert. The Contractor's Engineer shall determine steel area required, reinforcement details, splice lengths, location of construction joints, etc. The Contractor's Engineer shall be a Registered Professional Engineer in the State of Kansas.

1. The box culvert structure shall be designed to withstand the following concurrent loadings:

    a. AASHTO HS20-44 truck loading.

    b. Horizontal saturated soil pressure of 87.5 lb/sq. ft. per foot depth.

    c. Horizontal surcharge pressure of 60 lb/sq ft.

2. The box culvert structure shall be designed to pass the estimated maximum canal capacity, as stated in Section 01010, Part 1.01A, without overtopping.

B. Construction joints in floor and exterior walls shall contain water stop product.

1.04 SUBMITTALS

A. Refer to Section 01300.

B. Mix Design:

1. The Contractor shall submit a mix design, for approval, to the Contracting Officer prior to placing concrete.

2. The submitted mix designs shall include test results for the aggregate gradation and cement composition, and manufacturer's certifications for any proposed admixtures and curing compounds.

C. Placement Schedule: Prepare a placement schedule and submit for review prior to start of concrete placement operations.

D. The name of the proposed testing laboratory shall be submitted for approval.

E. Test reports shall be reported in writing to the Contracting Officer within 24 hours after the tests are made.

F. Box Culvert Design

1. Submit box culvert design documents prepared by the Contractor's Engineer.

1.05 QUALITY ASSURANCE

A. Concrete shall conform to the provisions of the ACI "Manual of Concrete Practice", Part I and II; ACI 301, "Specifications for Structural Concrete for Buildings"; ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete"; ACI 315, "Details and Detailing of Concrete Reinforcement"; and ACI 318, "Building Code Requirements for Structural Concrete."

1.06 TESTS

A. Testing firm will take cylinders for strength testing and perform slump, temperature, and air entrainment tests in accordance with Section 01400.

B. Two additional test cylinders will be taken for each series of tests during cold weather and cured on site under the same conditions as concrete it represents.

C. Cost of all testing is the responsibility of the Contractor and should be included in the cost of other work. Submit all test results to the Contracting Officer.

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

A. Portland cement used in this construction shall be Type V, which shall conform to ASTM C 150, "Standard Specification for Portland Cement." Other types of cement, if not called for on the drawings or by this specification, may be used only if approved by the Contracting Officer. Caked or hardened cement will not be permitted.

B. Aggregates: All aggregates shall conform to ASTM C 33, Standard Specification for Concrete Aggregates.

1. Coarse: Maximum size of course aggregate shall be 3/4 inch. Coarse aggregate shall consist of natural gravel or crushed rock or a mixture of natural gravel and crushed rock.

2. Fine: Fine aggregate shall consist of natural sand.

C. Water: Clean, potable, and not detrimental to concrete, and free of any deleterious amounts of acids, alkalis, and organic materials.

D. Admixtures: Admixtures may be used only if approved in advance and in writing by the Contracting Officer.

1. Chemical admixtures shall conform to ASTM C 494, "Standard Specification for Chemical Admixtures for Concrete."

2. Air-entraining admixtures shall conform to ASTM C 260, "Standard Specification for Air-Entraining Admixtures for Concrete."

2.02 PROPORTIONING AND DESIGN OF MIXES

A. The proportions of ingredients in concrete shall be selected and controlled to produce concrete having the required qualities of strength, workability, resistance to deterioration and abrasion, water-tightness, appearance and other required properties, all as specified herein or as called for on the drawings. These properties shall be determined from laboratory design trial mixes in accordance with methods and procedures set forth herein. Copies of the test results shall be furnished to the Contracting Officer.

B. Design mixes to provide normal weight concrete with the following properties:

1. Compressive strength: Minimum of 4,000 psi at 28 days.

2. Maximum Water-cement ratio: 0.45

3. Sand: The percentage of sand to total aggregate by solid volume should not exceed 34 percent. When a water reducing agent is used, the sand content shall be increased by 1 or 2 percent.

4. Slump: Concrete slump shall be 3 inches, plus or minus 1 inch.

5. Air content: Air content of concrete shall be between 4 to 6 percent.

6. Chloride ion: Maximum chloride ion (Cl^-) concentration in concrete shall not exceed 1/10 of 1 percent chloride by weight of cement.

7. The Contractor shall substitute fly ash for a portion of Portland Cement in the concrete, provided the concrete supplier's operations permit this substitution, and the supplier has been successful in making this substitution. If fly ash is utilized, it shall be incorporated into the concrete mix in accordance with the current USAF Environmentally Responsible Facilities Guide, and the Strategic Plan for Greening the Department of Interior, May 2000.

a. Fly ash substitution shall comply with the Kansas Standard Specifications for State Road and Bridge Construction.

b. The 28 day compressive strength of the concrete with fly ash must be equal or exceed the specified 28 day compressive strength of original mix design.

c. Changes in coal supply or source of fly ash will require the approval of a new mix design.

2.03 GROUT

A. Grout shall be non-shrink and consist of non-metallic aggregate, Portland cement, water reducing and plasticizing additive, and water. Grout shall be properly proportioned and the water content limited to that necessary to provide a workable mix.

2.04 CURING COMPOUNDS

A. Membrane curing compounds shall conform to ASTM C 309, "Standard Specification for Liquid Membrane - Forming Compounds for Curing Concrete," Type 2, and shall be approved by the Contracting Officer.

2.05 WATERSTOP

A. Water stop shall be a flexible strip that provides a positive seal by expanding upon contact with water. Shall be Volclay Waterstop –RX, as manufactured by CETCO Building Materials, 1500 W. Shure Dr. Arlington Heights, Illinois, 60004, or equal.

PART 3 EXECUTION

3.01 MIXING CONCRETE

A. All concrete shall be ready-mixed concrete and shall comply with the requirements of ASTM C 94, "Standard Specification for Ready-Mixed Concrete" and herein specified.

1. Ready-mix concrete meeting the above criteria shall be delivered by the Contractor to the jobsite. The Contractor shall have the needed equipment and personnel to place the concrete as soon as it is received at the jobsite. A mix certificate shall be furnished to the Contractor by the ready-mix driver for each load delivered to the jobsite. The certificate shall indicate, as a minimum, the project identification name and number, date, mix type, mix time, quantity, and amount of water introduced. There shall be no discrepancies of any kind between the Government-approved mix design and the mix certificate(s) which accompanies each ready-mix delivery.

2. Except as specified and approved, additional water shall not be added to the concrete after the initial introduction of mixing water to the batch. Additional tempering water may be added to the batch on arrival at the placement when the concrete slump is less than specified: however, the design water content and specified slump shall not be exceeded. After this tempering, additional water shall not be added to the concrete. After addition of tempering water, mixing shall be continued for a minimum of 30 revolutions. From the time of initial mixing, discharge of the concrete shall be completed before the drum has revolved a total of 300 revolutions or 1-1/2 hours, whichever comes first. Tempering water shall not be permitted once the concrete has started to set.

3. Hot weather concreting shall be defined by and conform to ACI 305R.

4. Cold weather concreting shall be defined by and conform to ACI 306R.

3.02 PREPARATIONS FOR PLACING

A. No concrete shall be placed until all formwork, installation of items to be embedded, and preparation of surfaces involved in the placement have been approved.

B. All surfaces of forms and embedded materials shall be free from curing compound, dried mortar, and other foreign substances before concrete placement is started.

C. All surfaces upon or against which concrete is to be placed shall be free from frost, ice, water, mud, and debris. Earth foundations shall be damp when concrete is placed against them. Surfaces shall be unfrozen and thoroughly moist but not muddy to a depth of 6 inches, or to impermeable materials, whichever is less.

D. If fresh concrete is to be placed against concrete which has set, the surface of the concrete in place shall be thoroughly cleaned of all loose material, laitance, dirt and other foreign matter. Immediately prior to placing the fresh concrete, the old concrete shall be soaked with water and covered with a coating of neat cement grout. The fresh concrete shall be placed before the grout has attained its initial set.

3.03 PLACING AND CONSOLIDATING CONCRETE

A. The Contractor shall give the Contracting Officer at least a 24-hour notice before batching begins for placement of concrete. Placing shall be performed only in the presence of an authorized representative of the Contracting Officer.

B. Concrete shall be deposited as nearly as practical in its final position and shall not be allowed to flow in such a manner that the lateral movement will cause segregation of the course aggregate from the concrete mass.

C. Concrete shall be placed in maximum lifts of 18 inches and shall be consolidated by vibration, so that the concrete is thoroughly worked around the reinforcement, around embedded items and into corners of forms, eliminating all air or stone pockets which may cause honeycombs, pitting, or planes of weakness. All concrete shall be consolidated immediately after placement with immersion-type vibrators having a minimum frequency of 7,000 vibrations per minute. The concrete shall be consolidated by inserting the vibrators vertically to full depth of the unconsolidated lift and approximately 3 inches into the previously consolidated lift below. Care shall be exercised to avoid contact of the vibrating head with embedded items and with formed surfaces which will later be exposed to view. Concrete shall not be placed upon other plastic concrete until the previously placed concrete has been thoroughly consolidated.

A spare vibrator shall be kept on the jobsite during all concrete placing operations.

D. Dropping concrete more than 5 feet vertically will not be permitted without the use of a tremie.

E. Hot weather concreting shall be defined by and conform to ACI 305R.

F. Cold weather concreting shall be defined by and conform to ACI 306R.

G. Do not splash concrete onto the CMP riser. Concrete splashed on the riser shall be completely cleaned off immediately to the satisfaction of the Contracting Officer.

3.04 CONCRETE FINISH

A. All concrete surfaces not form finished shall be screed and float finished.

B. Surface imperfections, recesses resulting from tie rod ends, honeycomb, etc. shall be repaired in accordance with paragraph 3.06, Concrete Repair.

3.05 CURING

A. Concrete curing shall be in accordance with ACI 301 and as specified herein.

B. All concrete surfaces shall be treated as specified to prevent loss of moisture from the concrete until the required curing period has elapsed or until immediately prior to placement of other concrete or backfill against those surfaces. Only sufficient time to prepare construction joint surfaces and to bring them to a surface-dry condition shall be allowed between discontinuance of curing and placement of adjacent concrete.

C. As soon as unformed concrete surfaces have been finished, as specified, and have attained a dull appearance free from bleed water and moist sheen, they shall be cured for at least 7 days. If high-early-strength concrete has been approved and used, the protection shall be maintained for at least 3 days.

D. One or more of the following curing methods shall be used:

1. Water Sprinkling: If this method is used, sprinkling must be frequent enough to keep the surface wet at all times. Intermittent wetting and drying of the surface must not occur during the curing period.

2. Absorbent mat or fabric kept continuously wet.

3. Membrane curing compounds shall be as specified in paragraph 2.04. Such compounds shall be applied in accordance with the requirements of ASTM C 309. Membrane curing shall be removed from any concrete surface which will have concrete or epoxy sealer placed next to it.

E. Forms shall remain in place for a minimum of 24 hours or until the concrete has hardened sufficiently to prevent structural collapse. Where required, repair of all minor surface imperfections shall be made immediately after form removal. Minor surface repair shall be completed within 2 hours after form removal and shall be immediately followed by the initiation of curing. Concrete surfaces shall be kept continuously moist after form removal until initiation of curing.

F. The temperature of the concrete shall be maintained between 50 and 90 degrees Fahrenheit for the required curing period. When necessary, the Contractor shall provide heating, covering, insulation, or housing of concrete, or cool aggregates and/or mixing waters to maintain the required temperature without injury to the concrete.

3.06 CONCRETE REPAIR

A. The Contractor shall repair all concrete that is damaged from any cause, honeycombed, fractured, or otherwise defective. The repair of concrete shall be made with concrete replacement, epoxy-bonded concrete, dry pack, Portland cement mortar, or epoxy-bonded epoxy mortar, as approved by the Contracting Officer.

B. The Contractor shall report defective areas immediately to the Contracting Officer after removal of forms and prior to repairs. If, in the opinion of the Contracting Officer, the defective areas cannot be adequately or satisfactorily patched, then the entire section of affected concrete shall be removed and replaced at no additional cost to the Government.

C. Conditions and Requirements for Concrete Repair

1. Minor surface imperfections, which will be exposed, shall be corrected by sack rubbing or surface grinding.

2. Recesses larger that 1/4 inch (minimum dimension) resulting from removal of tie rod ends shall be filled with dry pack unless the recesses are covered by concrete; or are covered by fill material and are above the maximum water table elevation.

3. All honeycombed or other defective concrete shall be removed to sound concrete, but in no case to a depth of less than one inch.

4. All corrections of minor surface imperfections and irregularities shall be completed within 2 hours after removal of forms. All dry-pack, concrete replacement less than 10 inches thick, and Portland cement mortar repairs shall be completed within 7 days after the original concrete placement. All repairs involving epoxy-resin bonding systems shall be performed after 7 days and before 60 days from the original placement. Concrete replacement over 10 inches thick and all other repairs shall be completed within 60 days after the original placement.

3.07 PROTECTION

A. During the curing period, the concrete shall be protected from damage by heat, cold, mechanical disturbances (particularly load stresses), heavy shock, and excessive vibration. All finished concrete surfaces shall be protected from damage by construction equipment, materials, or methods, and rain or running water.

3.08 TESTING

A. Refer to Sections 01300 and 01400.

B. Sampling and testing for quality control during placement of concrete will include the following:

1. Slump: One slump test at point of discharge for each load of concrete delivered; or additional tests when requested by the Contracting Officer. Slump shall be performed in accordance with ASTM C 143, "Standard Test Method for Slump of Hydraulic Cement Concrete".

2. Air Content: Perform a minimum of one air content test for each day's placement of each type of concrete in conformance with ASTM C 231, "Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method."

3. Concrete Temperature: Test each load of concrete delivered when the air temperature is 40 degrees Fahrenheit and below, and when 80 degrees Fahrenheit and above. In addition, one test shall be made each time a set of compression test specimens are made.

4. Compression Test Specimen:

   a. Obtain one set of 3 standards cylinders for each structural placement for each day, plus one additional test any day when the concrete placed exceeds 20 cubic yards, unless otherwise directed, in accordance with ASTM C 31, "Standard Practice for Making and Curing Test Specimens in the Field."

   b. All three specimens shall be taken from the same truck.

   c. One specimen shall be tested at 7 days, one specimen tested at 28 days, and one specimen retained in reserve for later testing if directed by the Contracting Officer.

   d. Identify all test cylinders with symbols to indicate location on the job where concrete test was made.

PART 4 ACCEPTANCE AND MEASUREMENT

4.01 ACCEPTANCE

A. Acceptance of the work of this Section shall be based on visual inspection and acceptance of the required submittals, according to Section 01300.

4.02 MEASUREMENT

A. All work required in this Section will not be measured for payment.

B. Payment for work in this Section, except design of box culvert, shall be included in the lump sum price bid in the Bid Schedule for Concrete Structure.

C. Payment for design of the box culvert, shall be included in the lump sum price bid in the Bid Schedule for Design for Box Culvert.

END OF SECTION 03300

PART I GENERAL

1.01 WORK INCLUDED

A. Furnish and install precast concrete box culvert sections, inlet and outlet transitions/aprons, and wing walls in accordance the requirements of this section and in conformance with the general dimensions shown on the drawings. The Contractor may choose to use either cast-in-place or pre-cast box culvert sections.

B. Concrete in precast members is not required to be pigmented.

1.02 RELATED SECTIONS

B. Excavation and Backfill, Section 02222.

1.03 REFERENCES

A. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.

B. ASTM A185 and A497 - Plain Steel Welded Wire Fabric and Deformed Steel Welded Wire Fabric for Concrete Reinforcement.

C. PCI MNL-116 - Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products.

D. PCI-MNL-120 - Design Handbook - Precast and Prestressed Concrete.

E. ASTM C150 - Portland Cement.

1.04 DESIGN REQUIREMENTS

A. The box culvert structure shall be designed and certified by a Registered Professional Engineer, licensed to practice in Kansas.

B. The box culvert structure shall be designed to withstand the following concurrent loadings:

1. HS20-44 truck loading

2. Horizontal saturated soil pressure of 87.5 lb/sq ft per foot of depth.

3. Horizontal surcharge pressure of 60 lbs/sq ft.

C. The box culvert structure shall be designed to pass the estimated maximum canal capacity, as stated in Section 01010, Part 1.01A, without overtopping.

D. Sections shall be designed to withstand loadings associated with lifting. Design shall take into consideration the manner in which the sections will be lifted.

E. Each section shall interlock with adjacent sections. Wing walls shall be mechanically fixed to the box culvert.

F. A cable tie system shall be incorporated into the design to secure sections together.

1.05 SUBMITTALS

A. Submit Certificate of Compliance that the precast system provided meets or exceeds loading requirements listed in 1.04B.

B. Submit shop drawings and product data under provisions of Section 01300.

C. Shop drawings shall indicate layout, fabrication details, unit identification marks, order of installation, reinforcement, connection details, dimensions, openings, etc., and shall be sealed by a Professional Structural Engineer.

1.06 QUALITY ASSURANCE

A. Perform work in accordance with the requirements of PCI MNL-116 and PCI MNL-120.

1.07 QUALIFICATIONS

A. Fabricator: Company specializing in manufacturing the work of this Section with minimum three years experience.

B. Erector: Company specializing in erecting the work of this Section and approved by fabricator.

C. Design precast concrete members under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of Kansas.

1.08 REGULATORY REQUIREMENTS

A. Structure shall conform to ACI 318 and applicable codes for design load and construction requirements applicable to work of this section.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver to site, store, and protect products under provisions of Section 01600.

B. Handle precast sections in position consistent with their shape and design. Lift and support only from support points.

C. Lifting or handling devices shall be capable of supporting sections in positions anticipated during manufacture, storage, transportation, and erection.

D. Protect sections to prevent staining, chipping, or spalling of concrete.

E. Mark each section with date of production and final position in structure.

PART 2 PRODUCTS

2.01 FABRICATORS

A. Known precast fabricators are:

1. Kansas City Concrete Pipe
23600 40th Street
Bonner Springs Industrial Park
Shawnee, KS 66226
Telephone 913-422-3634

2. Oldcastle Precast
5230 N.W. 17th Street
Topeka, KS 66618
Telephone: 785-232-2952

3. McPherson Concrete Products, Inc.
P.O. Box 369
116 North Augustus
McPherson, KS 67460
Telephone: 620-241-4362

2.02 MATERIALS

A. Cement: Portland, conforming to ASTM Cl5O, Type V.

B. Aggregate, Sand, Water, Admixtures: Determined by precast fabricator as appropriate to design requirements and PCI MNL-116. Aggregates shall be from the same source.

C. Coloring pigments are not required.

2.03 REINFORCEMENT

A. Reinforcing Steel: ASTM A615, deformed steel bars.

B. Plain and Deformed Wire Fabric: ASTM A185 and ASTM A497, respectively.

2.04 FABRICATION

A. Fabrication procedure to conform to PCI MNL-116.

B. Ensure reinforcing steel, inserts, and other cast-in items are embedded and located as indicated on shop drawings.

2.05 FINISHING

A. Ensure exposed-to-view finish surfaces of precast concrete members are uniform in color and appearance.

B. All volumes of concrete shall be uniform in all respects to ensure uniformity of the color of the finished concrete. Add color by weight as recommended by the manufacturer of the concrete color. The mixing operation shall be adequate to uniformly disperse the color throughout each batch.

C. Cure members under identical conditions to develop required concrete quality, and minimize appearance blemishes such as nonconformity, staining, or surface cracking. Cure colored concrete as recommended by the manufacturer of the concrete color.

PART 3 EXECUTION

3.01 PREPARATION

A. Place bedding material as required by approved foundation design.

B. Equipment and temporary bracing required for the erection shall be available and of sufficient strength and dimension to adequately and safely facilitate the process.

3.02 ERECTION

A. Box culvert sections and wing walls shall be installed level and to the lines shown on the drawings.

B. Erect sections without damage to structural capacity, shape, or finish. Replace or repair damaged members.

C. Align and maintain uniform horizontal and vertical joints, and straight alignment as erection progresses.

D. Maintain temporary bracing in place until final support is provided as needed.

E. A tie system shall be installed and tensioned after all box beam sections are in place. Attach wing walls to box culvert using approved attachment method.

3.03 PROTECTION

A. Protect structure members from damage caused by erection operations.

B. Perform operations ensuring safety of personnel at all times.

3.04 CLEANING

A. Clean weld marks, dirt, or blemishes from surface of exposed members.

END OF SECTION 03410

END OF DIVISION 3

PART 1 GENERAL

1.01 WORK INCLUDED

A. The work of this Section consists of fabricating, furnishing, and installing steel metalwork. Work includes:

1. Fabricated guardrail posts, rails, and accessories, galvanized.

2. Guardrail welding plates and fastening hardware, galvanized.

3. Expanded metal walkway, galvanized.

4. Stoplog guides, stainless steel.

5. Staff gage support structure and staff gage.

1.02 Related Work

A. Section 03300, Cast-In-Place Concrete

1.03 QUALITY ASSURANCE

A. References

1. American Society for Testing and Materials (ASTM)

ASTM A36 Specifications for Structural Steel

ASTM A123 Specifications for Zinc (Hot-Galvanized) Coatings on Iron and Steel Products

ASTM A153 Specifications for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM A780 Practice for Repair of Damaged Hot-Dip Galvanized Coatings

ASTM A240 Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

2. American Welding Society (AWS)

AWS D1.1-90 Structural Welding Code

3. American Institute of Steel Construction (AISC)

AISC S326 Specifications for the Design, Fabrication and Erection Of Steel Buildings

1.04 SUBMITTALS

A. Submit in accordance with Section 01300, Submittals.

B. Shop drawings shall be submitted for approval prior to fabrication in accordance with Section 01300, Submittals.

C. Certificate of Compliance certifying materials meet requirements set fourth herein.

D. Submit product data for manufactured items.

E. Submit welders certifications in accordance with Section 01400, Quality Control.

1.05 HANDLING AND STORAGE

A. All materials shall be handled and stored in careful and workmanlike manner to the satisfaction of the Contracting Officer.

PART 2 PRODUCTS

2.01 MATERIALS

A. Plates, angles, rod, bars, pipe, shapes, channel: Carbon steel, ASTM A36.

B. Metalwork requiring galvanizing shall be galvanized by the hot-dip process at 2 ounces per square foot. Refer to ASTM A123.

C. Materials for miscellaneous metalwork not specifically covered herein by detailed specifications shall be of good commercial quality consistent with industry standards and approved by the Contracting Officer.

D. Expanded metal walkway shall be Grip Strut Plank Grating, or equal. Shall be 8-diamond plank, 18.75” width, 2-inch height, 14 gauge, both cut to specified length, galvanized.

E. Plates, angles, and/or channel: Type 304L, ASTM A-240.

2.02 STOPLOG GUIDES

A. Plates, angles, and/or channel necessary to create a C channel shape. Material shall be stainless steel, Type 304L, ASTM A-240.

B. Guides shall be fabricated in sections including side rails and sill plate. The side rails shall extend from the channel invert to the top of the wall elevation below the metal grating covers. The side rails and sill plate shall constitute a complete frame. The frame shall be anchored/embedded to the concrete box culvert section as shown on the drawings. Surface mounted guides are not acceptable.

C. All accessories and appurtenant materials associated with the stoplog guides shall be fabricated from the same grade of stainless steel. Finish shall be mill finish on all surfaces.

2.03 STAFF GAGE

A. A water level gage shall be installed upon the downstream face of the box culvert bridge section, near the centerline of the structure. The purpose of the gage is to measure water depth in the canal above the canal invert.

B. The gage shall be attached to the inside surface of a C channel section mounted to the face of the concrete box culvert section. The C channel section shall be vertical and shall be mounted with one leg of the channel parallel to the long axis of the bridge. This mounting configuration will allow Station personnel to view the gage when standing on the roadway surface near the guardrail.

C. Gage shall be Stevens Type C or approved equal (www.stevenswater.com). Gage shall include porcelain enamel finish, graduation marks every 1/100th foot, numerical marks every foot and tenth foot. Style C gages are typically available in standard sections, 2.5 inches wide and 3.33 feet in height. Multiple sections may be stacked.

D. The C channel support and all mounting hardware shall be stainless steel (Type 304L, ASTM A240) or approved substitute corrosion proof material. Rubber grommets shall be used between the gage strip and all mounting fasteners to prevent chipping or fracturing of the gage.

E. The Contractor shall submit specifications and drawings describing the materials and mounting configuration for the staff gage. The submittals shall be reviewed and approved by the Contracting Officer prior to installation.

PART 3 EXECUTION

3.01 FABRICATION

A. Fabrication shall be in accordance with the applicable portions of the latest Specifications for the Design, Fabrication, and Erection of Structural Steel for Building (AISC) and the contract drawings.

B. All welding shall be performed in accordance with the latest edition of the American Welding Society's Structural Welding Code D1.1. Welding shall be done by the shielded arc method. Surfaces shall be clean and free from scale and foreign matter.

C. Where field painting may be required to correct damage caused by welds, cuts, etc., to galvanized surfaces, apply a high zinc oxide/zinc dust content paint conforming to ASTM A780. Zinc content shall be equivalent to or greater than that provided by the hot-dip process. Prepare surfaces as required for proper adhesion of coatings.

PART 4 ACCEPTANCE AND MEASUREMENT

4.01 ACCEPTANCE

A. Acceptance for the work of this Section shall be based on visual inspection and approval of required submittals, according to Section 01300.

4.02 MEASUREMENT

A. Metalwork will not be measured for payment. Payment for metalwork shall be included in the lump sum price bid in the Bid Schedule for Metalwork.

END OF SECTION 05500

END OF DIVISION 5